WHAT IS CLAIMED IS:

1. An *in-vivo* plasmapheresis and/or *in-vivo* ultrafiltration membrane comprising:

a plurality of elongated hollow fibers each fiber having an interior lumen extending along the length thereof and a fiber wall having a plurality of zones between the inner and outer wall surfaces, each of said zones having a mass density different than the mass density of an adjacent zone, said fiber wall characterized by having a lower mass density zone at the inner wall surface and a higher mass density zone at the outer wall surface.

2. A membrane of Claim 1 wherein said membrane fiber wall has two mass density zones.

3. A membrane of Claim 1 wherein said membrane fiber wall has three mass density zones.

4. A membrane of Claim 1 wherein membrane fiber wall has four or more mass density zones.

5. A membrane of Claim 1, 2, 3 or 4 wherein each of said zones is characterized by a different average nominal pore size.

6. A membrane of Claim 5 capable of *in-vivo* plasmapheresis wherein said lower mass density zone is characterized by a nominal average pore diameter of between about 1 μm and about 60 μm.

7. A membrane of Claim 5 wherein said higher mass density zone is characterized by a nominal average pore diameter of between about 0.3 μm and about 1 μm.

8. A membrane of Claim 6 wherein said higher mass density zone is characterized by a nominal average pore diameter of between about 0.3 μm and about 1 μm.

9. A membrane of Claim 1 characterized by having the capability of extracting at least 0.75 ml/min/cm^2/mm Hg of blood plasma at trans-membrane pressures of between about 5 and about 20 mm Hg.

10. A membrane of Claim 5 capable of *in-vivo* ultrafiltration wherein said higher mass density zone is characterized by a nominal average pore diameter of between about 0.005 μm and about 0.05 μm.

11. A membrane of Claim 1, 2, 3 or 4 comprising a polysulfone fiber.

12. A membrane of Claim 11 wherein said polysulfone includes a copolymer of polyethylene oxide and polyethylene glycol.

13. A membrane of Claim 11 wherein said polysulfone fiber is produced in the presence of a composition comprising polyvinyl pyrrolidone, N-methyl pyrrolidone, dimethyl acetomide or dimethyl sulfoxide, or mixtures of two or more thereof.

14. A membrane of Claim 13 wherein said polysulfone includes a copolymer of polyethylene oxide and polyethylene glycol.

15. An *in-vivo* plasmapheresis or *in-vivo* ultrafiltration membrane comprising a plurality of elongated hollow fibers each fiber having an interior lumen extending along the length thereof and defined by an inner wall surface, wherein the morphology of said fiber wall is asymmetrical between said inner wall surface and the fiber outer wall surface, said fiber wall having a higher mass density adjacent to the outer wall surface and a lower mass density adjacent to said inner wall surface.

16. A membrane of Claim 15 wherein the higher mass density fiber wall is characterized by pores having a smaller average nominal pore size as compared to the average nominal pore size in the lower mass density fiber wall.

17. A membrane of Claim 16 capable of *in-vivo* plasmapheresis wherein said lower mass density is characterized by a nominal average pore diameter of between about 1 μm and about 60 μm.

18. A membrane of Claim 16 or 17 wherein said higher mass density is characterized by a nominal average pore diameter of between about 0.3 μm and about 1 μm.

19. A membrane of Claim 16 capable of *in-vivo* ultrafiltration wherein said higher mass density is characterized by a nominal average pore diameter of between about 0.005 μm and about 0.05 μm.

20. A membrane of Claim 19 capable of *in-vivo* ultrafiltration wherein said lower mass density is characterized by a nominal average pore diameter of between about 1 μm and about 60 μm.

21. A plasmapheresis or ultrafiltration assembly of Claim 1 or 15 including a catheter in direct fluid communication with said interior lumen of said fiber.

22. A plasmapheresis or ultrafiltration assembly of Claim 21 comprising a dual lumen catheter.

23. A plasmapheresis membrane of Claim 6 or 17 having a plasma trans-membrane flux of between about 0.5 and about 9 ml/min/cm^2 @ 10 mm Hg.

24. A plasmapheresis membrane of Claim 1 or 15 wherein said higher mass density is characterized by a nominal average pore diameter of between about 0.7 μm and about 0.8 μm.

25. A plasmapheresis membrane of Claim 24 wherein said lower mass density is characterized by a nominal average pore diameter of between about 5 μm and about 40 μm.

26. A plasmapheresis membrane of Claim 25 having a plasma trans-membrane flux of between about 0.75 and about 4 ml/min/cm^2/@10 mm Hg.

27. An ultrafiltration membrane of Claim 1 or 15 wherein said higher mass density is characterized by a nominal average pore diameter of between about 0.01 μm and about 0.03 μm.

28. An ultrafiltration membrane of Claim 27 wherein said lower mass density is characterized by a nominal average pore diameter of between about 5 μm and about 40 μm.

29. An ultrafiltration membrane of Claim 28 having a trans-membrane flux (H_2O) of between about 0.75 and about 4 ml/min/cm^2/@10 mm Hg.

30. A method of carrying out *in-vivo* plasmapheresis and/or *in-vivo* ultrafiltration of a patient's blood, comprising:

implanting a filter device within a blood vessel of a patient, said filter device comprising a plurality of elongated hollow fibers each fiber having an interior lumen extending along the length thereof, said fiber wall having an asymmetrical pore size and asymmetrical mass density morphology between

inner and outer fiber wall surfaces wherein the mass density adjacent to said outer wall is greater than the mass density adjacent to said inner wall, and passing blood plasma and toxins through said fiber wall to said interior lumen and directing said blood plasma and toxins from the patient through said interior lumen.

31. A method of Claim 30 wherein said filter device includes a catheter in direct fluid communication with said interior lumen of said fibers, said method including directing said blood plasma and toxins from the patient through said catheter.

32. A method of carrying out *in-vivo* plasmapheresis and/or *in-vivo* ultrafiltration of a patient's blood, comprising:

implanting a filter device within a blood vessel of a patient, said filter device comprising a plurality of elongated hollow fibers each fiber having an interior lumen extending along the length thereof and a fiber wall having a plurality of zones between the inner and outer wall surfaces, each of said zones having a mass density different than the mass density of an adjacent zone, said fiber wall characterized by having a lower mass density zone at the inner wall surface and a higher mass density zone at the outer wall surface and passing blood plasma and toxins through said fiber wall to said interior lumen and directing said blood plasma and toxins from the patient through said interior lumen.

33. A method of Claim 32 wherein said filer device induces a catheter in direct fluid communication with said interior lumen of said fibers, said method including directing said blood plasma and toxins from the patient through said catheter.

34. A method of Claim 32 wherein said membrane fiber wall has two mass density zones.

35. A method of Claim 32 wherein said membrane fiber wall has three mass density zones.

36. A method of Claim 32 wherein membrane fiber wall has four or more mass density zones.

37. A method of Claim 32, 33, 34, 35 or 36 wherein each of said zones is characterized by a different average nominal pore size.

38. A method of Claim 32 wherein said lower mass density zone is characterized by a nominal average pore diameter of between about 1 μm and about 60 μm.

39. A method of Claim 32 for carrying out plasmapherisis wherein said higher mass density zone is characterized by a nominal average pore diameter of between about 0.3 μm and about 1 μm.

40. A method of Claim 38 for carrying out plasmapherisis wherein said higher mass density zone is characterized by a nominal average pore diameter of between about 0.3 μm and about 1 μm.

41. A method of Claim 32 comprising extracting at least 0.75 ml/min/cm^2/mm Hg of blood plasma at trans-membrane pressures of between about 5 and about 20 mm Hg.

42. A method of Claim 32 for carrying out ultrafiltration wherein said higher mass density zone is characterized by a nominal average pore diameter of between about 0.005 μm and about 0.05 μm.

43. A method of Claim 38 for carrying out ultrafiltration wherein said higher mass density is characterized by a nominal average pore diameter of between about 0.005 μm and about 0.05 μm.

44. A method of Claim 38 wherein said membrane has a plasma trans-membrane flux of between about 0.5 and about 9 ml/min/cm^2 @ 10mm Hg.

45. A method of Claim 32 wherein said lower mass density is characterized by a nominal average pore diameter of between about 5 μm and about 40 μm.

46. A method of Claim 45 for carrying out plasmapherisis wherein said higher mass density is characterized by a nominal average pore diameter of between about 0.7 μm and about 0.8 μm.

47. A method of Claim 45 wherein said membrane has plasma trans-membraine flux of between 0.75 and bout 4 ml/min/cm^2/ @ 10mm Hg.

48. A method of Claim 45 for carrying out ultrafiltration wherein said higher mass density is characterized by a nominal average pore of between about 0.01 μm and about 0.03 μm.

49. A method of Claim 32 for carrying out ultrafiltration wherein said membrane has a trans-membrane flux (H_2O) of between about 0.75 and about 4 ml/min/cm^2/ @ 10mm Hg